Constructed Wetlands as Wood Stork Habitat: Good, Bad, or Ugly?

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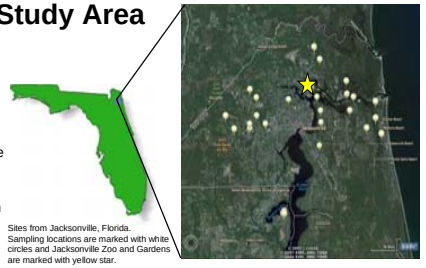
Wood storks (*Mycteria americana*) are an endangered bird associated with wetlands in the southeastern United States. One of the steps identified in the recovery plan is to assess potential contaminant risks to the storks. Man-made constructed wetlands are increasing while natural wetlands and marshes are decreasing rapidly. Previous studies by the United States Fish and Wildlife Service (USFWS) monitored movement of storks and found use of marshes and tidal areas during the breeding season, and a switch to freshwater constructed wetlands during nesting and fledging. Conditions of these constructed wetlands for wood storks are unknown.

Objectives of our project are to determine the productivity of the wood stork colony nesting at the Jacksonville Zoo, to determine actual use of constructed wetlands by wood storks, and to determine the quality of the constructed wetland habitat (i.e., contaminant concentrations in soil and prey).

Study Area

Since 2000 12 to 100 pairs of wood storks have nested within the African Habitat exibit of the Jacksonville Zoo and Gardens, Jacksonville, Florida. This nesting colony has used 2 large live oaks (*Quercus virginiana)* for the last 7 years. 10 to 20 pairs use two smaller live oaks, 2 to 5 m from the primary nesting trees. The wood storks forage in wetlands and shallow, open-water sites in the area surrounding the zoo. No supplemental fish are provided to the wood storks, although they have been known to steal from other enclosures.



Sites from Jacksonville, Florida. Sampling locations are marked with white circles and Jacksonville Zoo and Gardens are marked with yellow star.

Methods

Field study

- Storks (n=10) were trapped during the nesting season in 2007 and 2008, and satellite transmitters were attached
- Nesting was monitored throughout the nesting season for hatchling mortality and fledging success
- Foraging sites were determined by satellite data; sampling sites were selected from the sites meeting criteria.
- 15 sites each year sampled (n = 30)
- Data collected at each site included: water quality, sediment sample, prey sample (fish, amphibians, aquatic insects) and general habitat parameters
- 100 random ponds were identified via GIS data and monitored for an occupancy model

Lab methods and data analysis

- In 2007, samples were sent to contracted labs and assessed for organics (pyrene, Dieldrin, p,p'-DDE, trans-Nonachlor, and PCB-1268), metals, and PAHs
- In 2008, half of each sample was sent to contracted labs to analyze for metals, aromatics, total organic carbon, and organophosphates
- In 2008, ELISAs were run on half of each sample for DDE/DDT, cyclodienes, PCBs, microsystins, and organophosphate-carbamates
- Contaminant data from contracted labs will be analyzed using SAS statistical software
- ELISA data will be analyzed using SoftmaxPro software

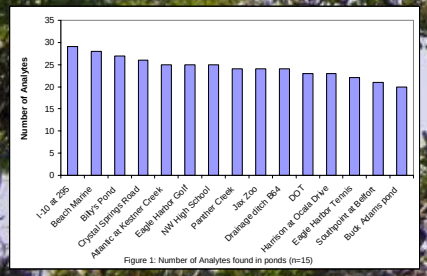


Figure 1: Number of Analytes found in ponds (n=15)

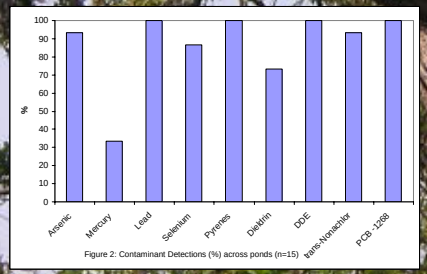


Figure 2: Contaminant Detections (%) across ponds (n=15)

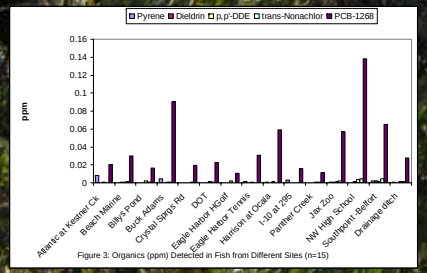


Figure 3: Organics (ppm) Detected in Fish from Different Sites (n=15)

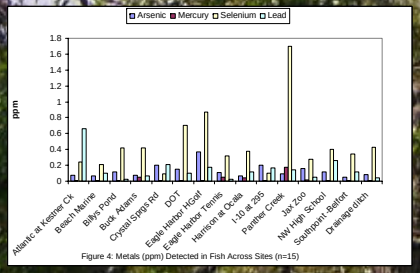


Figure 4: Metals (ppm) Detected in Fish Across Sites (n=15)

Discussion and Management Implications

Although we have only preliminary results, we can still discuss management implications. Wood storks and many other species use constructed wetlands. Our preliminary results show very low concentrations of contaminants in tested impoundments. In the future, constructed wetlands may be designed to encourage wood storks and other wildlife species to get food or water from them. This design could make slopes of these wetlands very gradual so wading birds have areas to forage. Plants that would encourage wildlife to feed could be planted around the edges of these ponds. In addition, ponds that show minimal concentrations of contaminants could be stocked, such as golf course ponds or neighborhood ponds. This would increase enjoyment for people who like to watch birds, who like to fish, and create a good habitat for wood storks to feed during breeding season. Alternatively, if concentrations are high in the second season of sampling, precautions could be taken to discourage wildlife from using these areas, such as steep slopes, fences, or grating. More research is needed before management decisions can be made.

Acknowledgements

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